2016 Honors PreCalculus Summer Assignment

You should use these problems as a guideline for the Algebra summer review <u>you need</u> in order to be ready for Precalculus Honors. The answers (you need to attach all your work) will be collected on <u>the first day</u> of the school year.

Make sure to put your name on every page.

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1. Plot the points (13, -1) and (5, 0). Find the coordinates of the midpoint of the line segment joining the points and the distance between the points.

2. State the domain, range, check for symmetry, and identify *x*- or *y*- intercepts for each of the following:

    a. $y = 6 + (x-1)^2$
    b. $y = \sqrt{9-x}$
    c. $(x+1)^2 + (y-2)^2 = 16$

3. A line with slope $m = \dfrac{5}{2}$ passes through the point (5, -1). List three additional points on the line.

4. Find an equation of the line for each of the following.

    (a) Passes through the points (-2, 0) and (5, 3).
    (b) Passes through the point (11, 0) and is perpendicular to the line $2x + 5y = 3$.

For problems 5 – 10, solve (if possible) the equation.

5. $2x + 3(4 - x) = 5$
6. $\dfrac{5}{t+1} + \dfrac{2}{t-2} = \dfrac{13}{t^2 - t - 2}$
7. $4y^2 + 8y + 2 = 0$
8. $\sqrt{x+5} = x - 1$
9. $3\sqrt{x} - \sqrt{2x-1} = 1$
10. $|2x+1| = 6$

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In problems 11 and 12, solve the inequality and sketch the solution on the real number line.

11. $\quad -2 \le 3(x-4) < 13$

12. $\quad \dfrac{1}{x} < \dfrac{3}{x+5}$

13. Evaluate the following and simplify your answer.

   a) If $f(x) = x^2 - 10$, find f(5) and f(-t)

   b) If $g(x) = \begin{cases} \dfrac{1}{3}x - 1 & x \le 2 \\ x = 20 & x > 2 \end{cases}$ find g(10), g(0) and g(2)

14. Determine the domain of the function.

   a) $f(x) = \sqrt{36 - x^2}$

   b) $h(x) = \dfrac{x+1}{x^2 - 7x + 10}$

15. Sketch the graph of the function.

   a) $f(x) = \dfrac{1}{2}(x+2)^2 - 7$

   b) $f(x) = \begin{cases} 3x & x < 0 \\ 2x^2 + 1 & x \ge 0 \end{cases}$

In problems 16 – 17, a) find f^{-1}, b) graph $f(x)$ and f^{-1} and c) verify that $f(f^{-1}(x)) = x = f^{-1}(f(x))$.

16. $\quad f(x) = \dfrac{1}{3}x - 5$

17. $\quad f(x) = \sqrt{1-x}$

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18. If $f(x) = 2 - 3x$ and $g(x) = \sqrt{x}$ find the following:

    a. $(f + g)(5)$

    b. $(g \circ f)(5)$

19. Identify the vertex and intercepts of the graph of $y = x^2 + 4x + 3$.

20. The path of a ball is given by $y = -\dfrac{1}{20}x^2 + 3x + 5$, where y is the height in feet and x is the horizontal distance in feet.

    a)   Find the maximum height of the ball.
    b)   Which constant determines the height at which the ball was thrown? Does changing this constant change the coordinates of the maximum height of the ball? Explain.

21. Divide by long division: $(3x^3 + 4x - 1) \div (x^2 + 1)$

22. Multiply and write the result in standard form: $(10 + 8i)(2 - 13i)$

23. List all the possible rational zeros of the function $h(x) = 3x^5 + 2x^4 - 3x - 2$

24. Find a polynomial function with integer coefficients that has the given zeros:

    $1 + \sqrt{3}i,\ 2,\ 2,\ -1 - \sqrt{2}$

25. Find a rational function with vertical asymptotes $x = \pm 5$ and a horizontal asymptote at $y = 2$.